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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/749,578

12/30/2003

Kwan-Ju Koh

20067/OPP031477US

8991

34431

7590

01/05/2006

HANLEY, FLIGHT & ZIMMERMAN, LLC
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CHICAGO, IL 60606

EXAMINER

BOOTH, RICHARD A

ART UNIT

PAPER NUMBER

2812

DATE MAILED: 01/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

sf

Office Action Summary	Application No.		Applicant(s)	
	10/749,578		KOH, KWAN-JU	
	Examiner		Art Unit	
	Richard A. Booth		2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 October 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>1005</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kwak et al., U.S. Patent 5,940,730 in view of Yoshiki et al., U.S. Patent 5,843,236.

Kwak et al. shows the invention substantially as claimed including a method for forming a contact hole or a via hole in a semiconductor device comprising: rounding a top edge of a contact hole or a via hole by using a plasma when an interlayer insulation film is selectively etched to form the contact hole or the via hole (see figs. 1a-1c and col. 2-line 14 to col. 3-line 12).

Kwak does not expressly disclose that the plasma has a spiral movement.

Yoshiki et al. discloses a plasma etching process whereby the plasma has a spiral movement (see col. 3-lines 10-21). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Kwak et al. so as to use a plasma with a spiral movement because in such a way the plasma density can be enhanced.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kwak et al., U.S. Patent 5,940,730 in view of Yoshiki et al., U.S. Patent 5,843,236 as applied to claim 2 above, and further in view of Mihara et al., U.S. Patent 5,681,780.

Kwak et al. and Yoshiki et al. are applied as above but do not expressly disclose etching using a gas of fluorine series.

Mihara et al. discloses etching a contact hole using fluorocarbon gas (see col. 1-lines 20-25). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to etch the contact hole in the process of Kwak et al. modified by Yoshiki et al. using fluorocarbon gas since this is shown to be a suitable method in which to etch a contact hole.

Claims 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kwak et al., U.S. Patent 5,940,730 in view of Yoshiki et al., U.S. Patent 5,843,236 as applied to claim 2 above, and further in view of Lee et al., U.S. Patent 5,998,870.

Kwak et al. and Yoshiki et al. are applied as above but do not expressly disclose forming a barrier metal film on the inner wall of the contact hole and filling the contact hole with a metal material.

Lee et al. discloses forming a barrier metal film 37 on the inner wall of the contact hole and filling the contact hole with a metal material 43b (see figs. 7a-7c and their description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Kwak et al.

modified by Yoshiki et al. so as to form the metal structure in the contact hole because such a configuration allows for the formation of a buried contact.

Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kwak et al., U.S. Patent 5,940,730 in view of Yoshiki et al., U.S. Patent 5,843,236 and further in view of Mihara et al., U.S. Patent 5,681,780 as applied to claim 3 above, and further in view of Lee et al., U.S. Patent 5,998,870.

Kwak et al., Yoshiki et al., and Mihara et al. are applied as above but do not expressly disclose forming a barrier metal film on the inner wall of the contact hole and filling the contact hole with a metal material.

Lee et al. discloses forming a barrier metal film 37 on the inner wall of the contact hole and filling the contact hole with a metal material 43b (see figs. 7a-7c and their description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Kwak et al. modified by Yoshiki et al. and Mihara et al. so as to form the metal structure in the contact hole because such a configuration allows for the formation of a buried contact.

Response to Arguments

Applicant's arguments filed 10/5/05 have been fully considered but they are not persuasive. Applicant argues that the combination of Kwak et al. and Yoshiki et al. is not proper because Yoshiki et al. changes the principle of operation of the Kwak et al. reference. However, the examiner respectfully disagrees since the Yoshiki et al.

reference is relied upon to show an alternative and the benefits of etching with a spiral plasma as opposed to the method disclosed in Kwak et al..

Conclusion

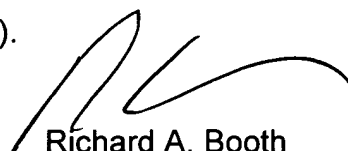
THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard A. Booth whose telephone number is (571) 272-1668. The examiner can normally be reached on Monday-Thursday from 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, consisting of a stylized 'R' followed by a horizontal line and a small upward curve.

Richard A. Booth
Primary Examiner
Art Unit 2812

December 14, 2005